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MERCHANDISING Winter Pears IN RETAIL FOOD STORES

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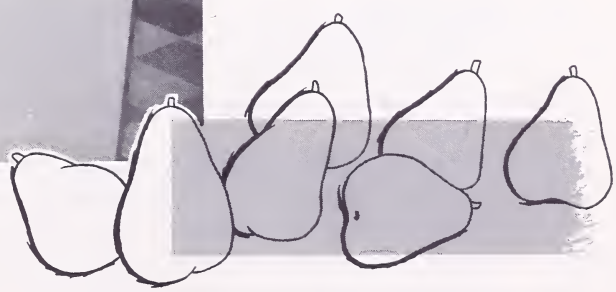

MARKETING RESEARCH REPORT NO. 102
U. S. DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service

Washington, D. C.

PREFACE

This is one of a series of merchandising reports on studies conducted at the retail store level on different agricultural commodities. A report has been issued on apples, lettuce, and tomatoes. Additional reports are planned on canned red sour cherries, carrots, bananas, cheese, and butter.

The cooperation of the Kroger Company in allowing observation and experiments in its retail stores in Pittsburgh, Pa., made this merchandising research possible. Special appreciation is due R. D. Hardesty and Harvey Seaman of the Kroger Company Research Department, Cincinnati, Ohio; Robert Tinsley, produce merchandising manager of the Pittsburgh Branch of the Kroger Company; and the store and produce managers in the experimental stores.

Appreciation is expressed to R. A. Patterson, executive secretary, and Arthur McNally, eastern representative of the Oregon-Washington-California Pear Bureau, for their part in the development and conduct of the experiment on winter pears.

The Amalgamated Food Employees Union, Local No. 590, Pittsburgh, Pa., cooperated in this research by waiving union membership requirements for the enumerators who collected the retail store data and maintained displays in the experimental stores.

S. A. Robert, Jr., Agricultural Marketing Service, U. S. Department of Agriculture, and Wayne A. Lee, Department of Agricultural Economics, Pennsylvania State Agricultural Experiment Station, planned the retail merchandising studies.

The study on which this report is based was conducted under authority of the Agricultural Marketing Act of 1946.

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MERCHANDISING WINTER PEARS IN RETAIL FOOD STORES

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Market Development Branch

SUMMARY AND CONCLUSIONS

The purpose of this research on merchandising winter pears in retail stores was to evaluate consumer response to large-, medium-, and small-sized pears when offered in various combinations of sizes and packages; to ascertain the relationships in consumer purchases between bulk and packaged pears; and to determine which of several methods of merchandising will sell the most pears.

Results of the 4 methods tested during the 4-week experiment indicated that the display that increased sales most was a combination of medium-sized pears in bulk and in packages of 6 with large pears in bulk and in packages of 3, 4, 6, and 8. This display resulted in a 26-percent increase in sales over the display of medium-sized pears alone.

For medium-sized pears, consumers seemed to prefer packages containing 6 pears, with packages of 8 pears also available. For the smaller sizes, the most desirable number was 6 to a package. However, to increase sales as much as possible, it seems desirable to provide a limited number of packages containing 8, 10, and 12 pears since more pears can be sold in these larger packages with each purchase.

During the experiment, 76 percent of the winter pears sold were in packages. This finding emphasizes the relative importance of packaging in developing an overall merchandising program for pears.

Sales of winter pears indicate that consumers do not readily discern the difference in size of pears unless the range in size is wide.

Expressed as a percentage of total sales, approximately 8 percent of the winter pears were lost through spoilage during the experiment in the 12 retail stores.

To increase sales, results of the research indicated that (1) displays should include a combination of small-, medium-, and large-sized pears; (2) displays should include both packaged and bulk pears, and (3) the appearance of the pears should stimulate purchases. Compared with sales of medium-sized pears displayed alone, displays combining large- and medium-sized pears tended to increase sales; displays combining small and medium sizes did not materially decrease overall sales. The number of pears to a package should vary according to size of the pears--6 to 8 medium

pears to a package, 3 to 6 large ones, and 6 to 12 small pears. The number of packages containing 10 and 12 small pears should be limited as movement in these packages may be relatively slow.

BACKGROUND OF THIS STUDY

Pear growing in the Pacific Coast States has become one of the major deciduous fruit industries. The commercial production of pears began more than 100 years ago. In the Pacific Coast States, pears were first grown commercially in California, then, 50 years later, in Oregon and Washington. 1/ During 1954 these three States accounted for approximately 87 percent of the pears produced in the United States, or 26.4 million bushels. 2/

Anjou, Bosc, Comice, and Winter Nelis are considered the major varieties of winter pears produced on the west coast. Winter pears are usually on the domestic market from October through May. Market outlets for winter pears include retail stores, processors, and exports to foreign countries. Before World War II, well over a third of the total winter pear production moved into the export market. However, since 1950, only about 10 percent of the production has been exported. With increased production and substantially smaller exports, the pressure on larger domestic sales has increased steadily during the last few years. About 8 to 10 percent of the annual winter pear production is processed. In some seasons the proportion processed may be higher, depending largely upon the average size of pears harvested.

Large metropolitan centers in the Northeast region receive a large portion of the pears marketed fresh in this country. The relatively high consumption of winter pears in the Northeast may be attributed partly to the level of per capita income for this region. Consumption of winter pears is apparently related to income levels. 3/

Increased production of pears, growth in their importance as a domestic fruit, and a specialized marketing system have caused producers and industry groups to rely more on retailers to move larger quantities of pears to consumers.

1/ Kinman, C. F., and Magness, J. R. Pear Growing in the Pacific Coast States. Farmers' Bulletin 1739, U. S. Dept. Agr.

2/ United States Agricultural Marketing Service. Production, Farm Disposition, and Value, Principal Fruits and Tree Nuts, 1953 and 1954 Seasons. U. S. Dept. Agr., 22 pp. January 1955. (Processed.)

3/ Rothwell, Naomi D., and Bayton, James A. Consumer Preferences Regarding Apples and Winter Pears. U. S. Dept. Agr., Agr. Inf. Bull. 19, p. 16, 1950.

Producers of winter pears have met with some difficulty in moving large- and small-sized pears into retail outlets. The historical pattern has been for many retailers to offer consumers only medium-sized winter pears; that is, those ranging in size from 110 to 150, based on the number of pears required to fill a standard box. Information as to the degree of consumer acceptability of large and small sizes of winter pears--80's, 90's, 165's, and 180's--has not been available to retail store managers. In view of this lack of information, consumers for the most part were not offered large and small pears. Research reported upon here is aimed directly at measuring and evaluating consumer acceptability of the large and small sizes in combination with the medium-sized pears so as to provide the retail trade and producers with definitive information as to the sizes of pears consumers will buy.

Certain changes have recently occurred in retail marketing which affect the sales of this commodity. Particularly, reference is made to the advent of self-service supermarkets. Supermarkets offer many new advantages to consumers in individual selection of produce and fresh fruit. However, inherent in the very nature of the supermarket's operation is the problem of developing merchandising techniques which will present the various products offered to consumers to best advantage. Sales personnel are no longer at the point of purchase to induce consumers to take a commodity or to take a certain quantity of the commodity. Instead, the selling task must now be effected through improved merchandising methods. Furthermore, pears are usually bought as an impulse item; that is, they are not usually included on the predetermined shopping list of the consumer. A study of consumers' preference for pears indicates that pears are usually eaten uncooked. 4/ Therefore, the condition of the pears and the manner in which they are displayed and packaged affect the consumers' decision about buying the pears. From the standpoint of merchandising, what size or combination of sizes of pears will result in the greatest quantity of sales? What size of unit of sale best contributes to this objective? Will a display of packages or bulk, or a combination of packages and bulk increase sales? These, and possibly other questions, should be answered in order to develop a merchandising program which offers the best possibility of increasing the overall sales of the commodity at the retail level.

The Department of Agricultural Economics of the Pennsylvania Agricultural Experiment Station and the Agricultural Marketing Service, U. S. Department of Agriculture, jointly conducted a retail merchandising experiment on fresh winter pears in a sample of 12 retail food chain stores in Pittsburgh, Pa. The Oregon-Washington-California Pear Bureau cooperated in this experiment

4/ Ibid.

by making available their merchandising representative, who assisted in delineating the problems confronting the industry and in developing the merchandising experiment carried out in the retail stores.

OBJECTIVES

Merchandising experiments for particular commodities are useful for delineating or sorting out those methods which hold most promise of moving larger quantities of the product to consumers. The decision of a retailer to use a particular merchandising technique or a variation thereof can be made on a more definitive basis as a result of the findings in this area of research.

The purpose of research on winter pears at the retail store level was to (1) evaluate consumer response in terms of sales of the large (80's and 90's) and small (165's and 180's) sizes of winter pears when offered in combination with the medium size, 150; (2) determine the combination of size and number of winter pears in a package which would induce larger purchases; (3) ascertain the relationship in consumer purchases between bulk and packaged winter pears when offered in combination; and (4) select the combination of factors tested which would provide the best merchandising program for winter pears in retail outlets.

Alternative methods of merchandising winter pears were evaluated, using rotational type experimental designs to minimize time and store differences. The merchandising methods used in this experiment were as follows:

A. Medium-sized pears, size 150, sold in bulk and in a package of 6.

B. Medium-sized pears, size 150, sold in bulk and in packages of 6, 8, 10, and 12.

C. Medium-sized pears, size 150, sold in bulk and in a package of 6, in combination with small pears, sizes 165 and 180, sold in bulk and in packages of 6, 8, 10, and 12.

D. Medium-sized pears, size 150, sold in bulk and in a package of 6, in combination with large pears, sizes 80 and 90, sold in bulk and in packages of 3, 4, 6, and 8.

RESULTS OF MERCHANDISING METHODS TESTED

The latin square design of controlled experimentation was used to test four methods of merchandising winter pears. One standard merchandising method (medium-sized pears in bulk and in a package of 6) was common to all methods throughout the test. The standard display provided a basis for comparing all factors being tested in the experiment.

In each of the stores in which the test was conducted, the size of the display of winter pears remained the same throughout the test period regardless of the merchandising method being tested. That is, the effect of the size of display on the volume of sales was the same for each of the four methods tested.

Findings from the experiment are applicable at the retail level. The study did not include an appraisal of the handling and packaging of winter pears at any other stage in the marketing channel.

Volume of Sales

The effectiveness of each of the four merchandising methods tested was based on total sales by that particular method in the 4-week retail store experiment. Each method differed from another in either size of pears or in number of pears to a package. Sizes were small, medium, and large. Certain packages in the experiment included up to 12 pears (fig. 1). Pears were retailed at the same price per pound regardless of size of pear or whether in bulk or package. Of the merchandising methods tested, the findings indicated that more pears were sold when the display consisted of medium-sized pears in bulk and in a package of 6 in combination with large pears in bulk and in packages of 3, 4, 6, and 8 (table 1).

The method of displaying medium and large sizes in combination (method D) sold 32 percent more pears than the method displaying medium and small sizes in combination (method C). Furthermore, the display of medium and large sizes in combination resulted in a 26-percent increase in sales over the method of displaying medium-sized winter pears in bulk and in a package of 6 (method A). The combination display of medium- and large-sized pears, in terms of quantities sold, proved to be statistically significant at the 5-percent confidence level from the three other merchandising methods tested. 5/ The other three merchandising methods did not

5/ When a significant difference between merchandising methods exists, the variation in the quantity of sales may be attributed to the merchandising method and not to chance variation.

Figure 1.- Merchandising medium-sized winter pears in bulk and in packages of 6, 8, 10, and 12.

prove to be significantly different from each other at a statistically acceptable confidence level in terms of the quantities sold through such methods during the experiment.

Table 1.- Quantity of winter pears sold by specified methods in 12 food chain stores, Pittsburgh, Pa. 1/

Merchandising method	Sales
	Pounds
A. Medium-sized pears, size 150, in bulk and in package of 6	2,405
B. Medium-sized pears, size 150, in bulk and in packages of 6, 8, 10, and 12	2,450
C. Medium-sized pears, size 150, in bulk and in package of 6 with small pears, sizes 165 and 180, in packages of 6, 8, 10, and 12	2,280
D. Medium-sized pears, size 150, in bulk and in package of 6 with large pears, sizes 80 and 90, in bulk and in packages of 3, 4, 6, and 8.	2/3,025

1/ Includes 4 test weeks beginning February 28, 1955.
2/ The difference in average sales between this method and the other three is statistically significant at the 5-percent confidence level.

Unit of Sales for Winter Pears

One of the basic fundamentals of merchandising is to establish the size of unit in which to retail the commodity. In the experiment on winter pears, an attempt was made to ascertain the most acceptable number of pears of varying sizes to offer consumers in a retail package.

A record of individual purchases by number of pears to a tray was maintained for each size of pear utilized in the test (table 2). The preferred number of medium-sized winter pears to a package appears to be 6, with somewhat fewer purchases of packages containing 8 pears. Purchases of medium-sized pears fell off sharply when more than 8 were placed in a package. However, the decrease in pounds of pears sold in packages containing more than 8 pears was not as great as the decrease in number of individual purchases, since more pears were taken in each purchase.

For the smaller sizes of winter pears, the most acceptable number to a package was 6. However, results indicate that 8 pears in a package should also be made available when small sizes are being marketed. Consumer purchases of small-sized pears were considerably reduced when packages with more than 8 pears were offered in the retail store experiment. However, in order to increase

sales, it appears desirable to display a limited number of packages containing 10 or 12 pears each, since these packages offer the possibility of moving a substantially larger quantity with each purchase.

Table 2.- Number of purchases of winter pears in packages of various sizes by specified methods in 12 food chain stores, Pittsburgh, Pa. 1/

Merchandising method	Purchases of pears in packages (trays) of--					
	3 pears	4 pears	6 pears	8 pears	10 pears	12 pears
	Number	Number	Number	Number	Number	Number
Medium-sized pears in bulk and in package of 6 (A):						
Size 150	0	0	1,063	0	0	0
Medium-sized pears in bulk and in packages of 6, 8, 10, and 12 (B):						
Size 150	0	0	535	211	46	39
Medium-sized pears in bulk and in package of 6 in combination with small pears, in bulk and in packages of 6, 8, 10, and 12 (C):						
Size 150	0	0	372	0	0	0
Size 165	0	0	104	86	36	27
Size 180	0	0	124	105	29	29
Medium-sized pears in bulk and in package of 6 in combination with large pears in bulk and in packages of 3, 4, 6, and 8 (D):						
Size 150	0	0	381	0	0	0
Size 80	85	82	81	36	0	0
Size 90	96	90	96	32	0	0

1/ Includes 4 test weeks beginning February 28.

When large-sized pears are offered to consumers, results indicate that no more than 6 pears should be placed in a package. From the findings, it also appears desirable to display packages of 3 and 4 pears with the packages of 6 pears.

Bulk and Packaged Sales of Winter Pears

In each of the merchandising methods tested, winter pears were displayed in combination of bulk and packages (fig. 2). Pears were packaged in cardboard trays similar to the type used for packaging meats for self-service counters, and were placed in a polyethylene bag.

Earlier merchandising studies indicated that the importance of packaged sales as compared to bulk sales depends largely upon the commodity being marketed. 6/ Therefore, in each of the merchandising methods tested, records were maintained of the quantity of winter pears sold in bulk and in packages.

Of the total quantity of pears sold during the experiment, 76 percent were retailed in packages. The relationship between package and bulk sales remained relatively the same in 3 of the 4 merchandising methods tested (fig. 3). However, bulk sales appeared to be somewhat greater when large-sized pears were offered in combination with medium-sized pears. The resultant increase in bulk sales of the larger pears may be accounted for partly by a desire on the part of some consumers to purchase in quantities smaller than those offered in packages.

Although the findings indicate that more winter pears are sold to consumers in packages than in bulk, the elimination of bulk displays would not necessarily increase overall sales. This information emphasizes the relative importance of packaging in developing an overall merchandising program for pears--a program that will most nearly satisfy consumer wants by providing various numbers of pears to a package, depending upon the size of pear being retailed.

6/ Smith, Hugh M. Merchandising Studies in Supermarkets--Apples, Lettuce, and Tomatoes. U. S. Agr. Mktg. Serv., AMS-18, pp. 3 and 5, March 1955.

Figure 2.- Medium- and large-sized winter pears displayed in combination of bulk and package.

Sales of Winter Pears by Sizes

In the experiment consumers were offered three choices--medium-sized pears alone, medium with small, and medium with large. The consumer was provided an opportunity to choose pears solely on the basis of size, since the price per pound and quality were identical. Figure 4 shows the relationship between consumer response to each of the various sizes of pears and the total sales of the merchandising method in which the size was offered.

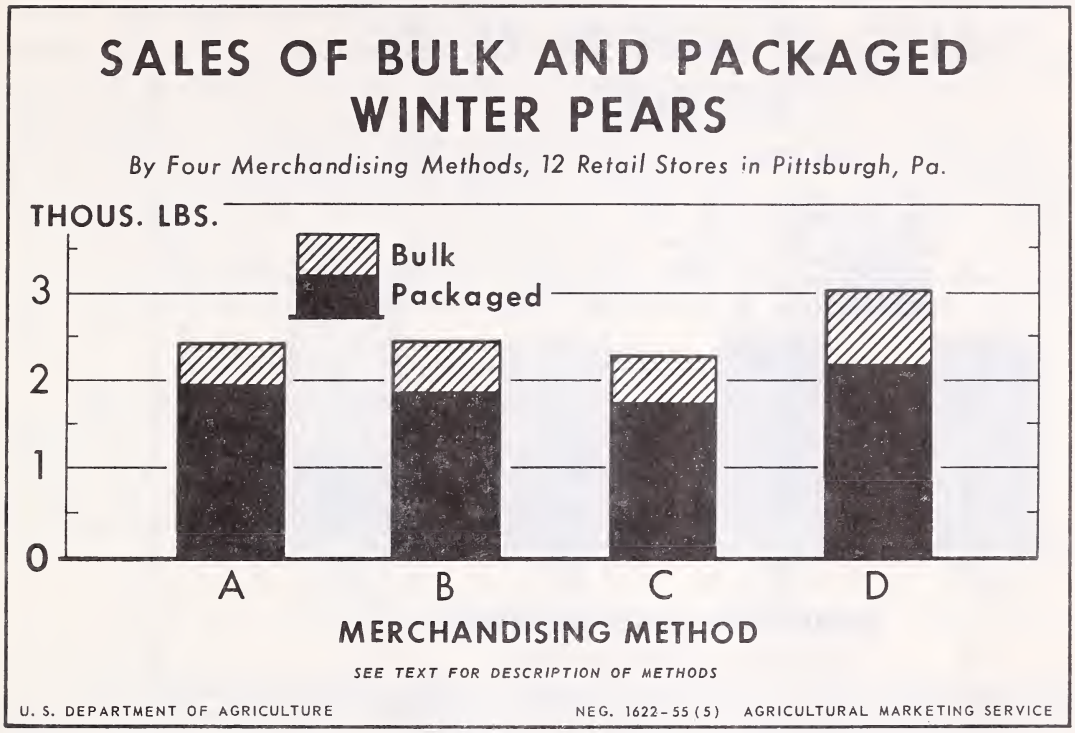

Figure 3

When consumers were offered a choice of large and medium-sized pears, approximately two-thirds of the total sales were of the larger sized pears (fig. 4). Consumer acceptability between large winter pear sizes 80 and 90 was almost equal. This fact is important, since it indicates that the variation between these two sizes is evidently not very discernible to the consumer. However, the findings reveal that consumers do differentiate between medium and large pears. The results indicate that sales were maximized when medium and large sizes were offered together in the experimental displays.

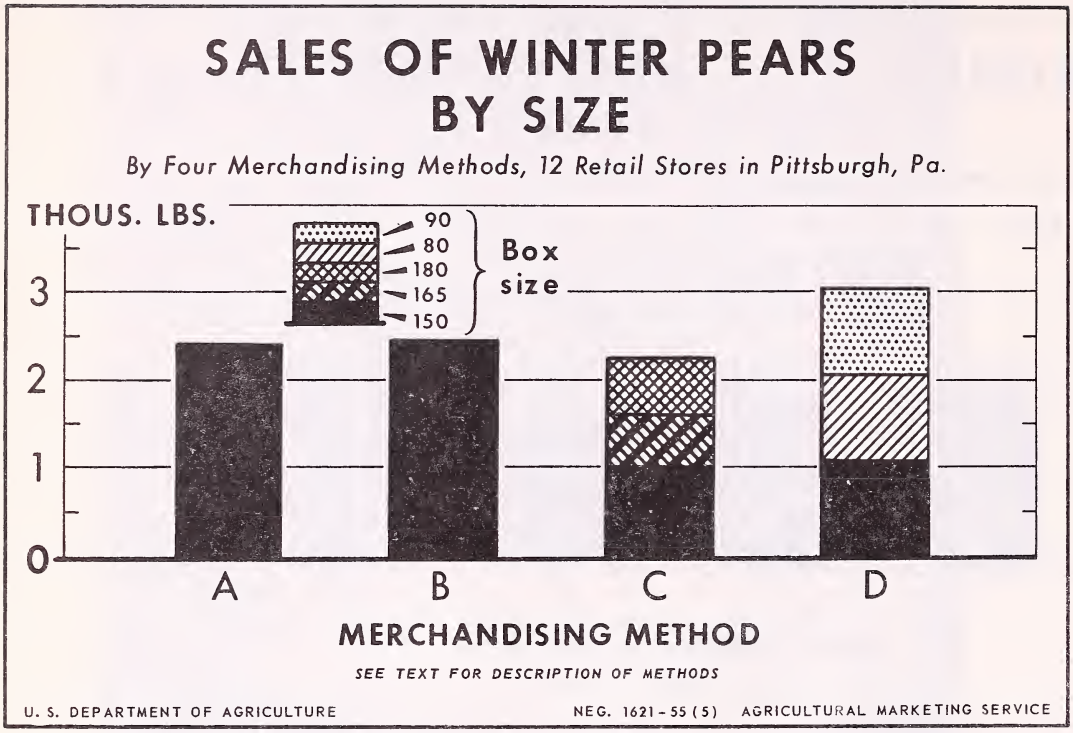

Figure 4

When medium-sized pears were displayed with the smaller ones, consumer purchases of the medium and smaller sizes approximated each other. Consumer response, in terms of sales, to the two sizes of small winter pears, was almost equal. This fact gives further evidence that consumer discernibility is not great within a relatively narrow range of sizes but only between extremes of small, medium, and large. This experiment also indicates that sales of pears were not noticeably reduced when medium and small sizes were offered together. The importance of this finding lies in the fact that small pears can be marketed in retail outlets without seriously impairing the overall sales of the product.

Spoilage

Inherent in the marketing of many fresh agricultural products is the problem of lost potential sales as a result of spoilage. The overall quantity of pears maintained in the retail stores was relatively the same for each merchandising method tested, although the number of different sizes of pears held varied by method. The total quantity of pears spoiled during the experiment, expressed as a percentage of total sales, was approximately 8 percent. There was considerable variation in the quantity of spoilage when evaluated by each of the merchandising methods tested (fig. 5). The findings from an analysis of variance indicated that the spoilage which occurred when the medium-sized pears were displayed with the smaller sizes was significantly greater than the spoilage which occurred in the two merchandising methods which consisted of medium-sized pears only. 7/

The movement of large- and small-sized pears through retail channels has been relatively slow because of a limited market. Therefore, the high occurrence of spoilage in methods C and D may be due partly to the length of time the large and small pears are held before being placed in retail outlets (fig. 5).

METHODOLOGY

The basic rotational latin square technique 8/ was used in the experimental testing of alternative methods of merchandising winter pears. By rotating the merchandising methods being tested from store to store, the effects on retail sales of nontest variables--differences in size and type of stores, seasonality in demand, competition from other products, and differences in preference of customers among stores--were equalized. The effect of certain other variables on the volume of sales was minimized by holding them constant throughout the experiment in all test stores. 9/ The size, location, and display of pears were kept constant throughout the test periods by arrangement with officials of the chain store. Pricing and advertising policies for the commodity tested were uniform for all stores included in the experiment. In addition, changes in retailing procedures for competing products were likewise kept as uniform as possible within the experimental stores. Retailing practices applying both to the experimental and nonexperimental commodities were coordinated by all stores.

7/ Statistically significant at the 5-percent confidence level.

8/ Snedecor, George W. Statistical Methods. The Iowa State College Press, Ames, Iowa, 1948, pp. 271-85.

9/ Cornell University. Agricultural Experiment Station. Dept. of Agr. Econ. Methods of Research in Marketing. Paper No. 1, pp. 36-391. 1951.

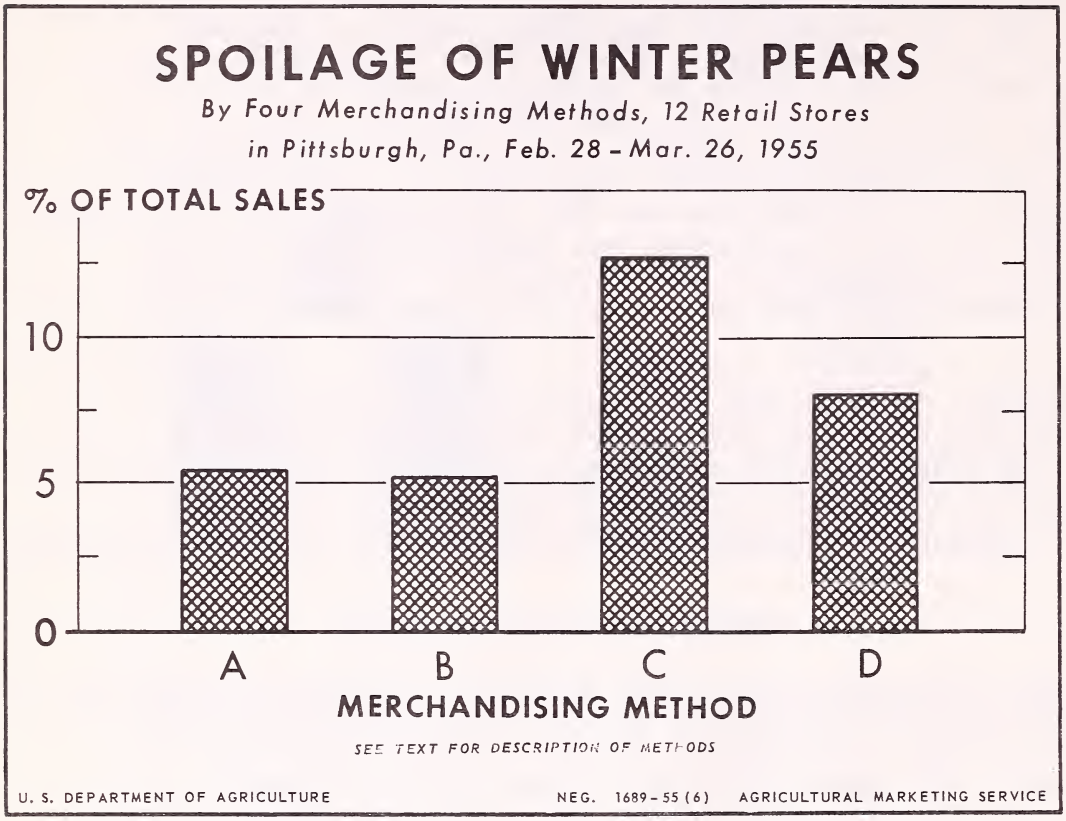

Figure 5

The official test on pears covered a 4-week period beginning February 28 and ending March 26, 1955. The experiment was conducted in 12 self-service retail food stores of a national chain. Each store participating in the experiment was randomly assigned to a latin square, and the store's position within each latin square was also randomly assigned during each time period. Using the rotational latin square design, 4 methods of merchandising were tested for winter pears. Each merchandising method was rotated each week so that after the 4-week period, every merchandising method had been tested during 1 of the 4 weeks in all 12 stores (table 3). The basic design was replicated three times in each period by application of 3 sets of 4 stores or a total of 12 stores each experimental period.

The analysis of variance technique was used in analyzing the data to obtain and assign the existing variation to specific components (tables 4 and 5). In this study the components were weeks

Table 3.- Experimental design for pears, Pittsburgh merchandising experiment, February 28 through March 26, 1955

Time period	Merchandising method 1/ tested in store number--			
	1	2	3	4
February 28-March 5	A	B	C	D
March 7-March 12	B	A	D	C
March 14-March 19	C	D	A	B
March 21-March 26	D	C	B	A
	5	6	7	8
February 28-March 5	A	B	C	D
March 7-March 12	D	C	B	A
March 14-March 19	B	A	D	C
March 21-March 26	C	D	A	B
	9	10	11	12
February 28-March 5	A	B	C	D
March 7-March 12	C	D	A	B
March 14-March 19	D	C	B	A
March 21-March 26	B	A	D	C

1/ Treatment code letters refer to merchandising methods for pears as follows:

A. Winter pears, size 150, sold in bulk and in packages of 6.

B. Winter pears, size 150, sold in bulk and in packages of 6, 8, 10, and 12.

C. Winter pears, size 150, sold in bulk and packages of 6; and winter pears, size 165-180, sold in bulk and in packages of 6, 8, 10, and 12.

D. Winter pears, size 150, sold in bulk and in packages of 6; and winter pears, size 80-90, sold in bulk and in packages of 3, 4, 6, and 8.

Table 4.- Analysis of variance table for determining significance of effects of stores, weeks, and treatments on quantity of winter pears sold during various time periods, by specific stores in Pittsburgh, Pa., February 28 through March 26, 1955 1/

Source of variation	Sum of squares	Degrees of freedom	Mean square	Variance ratio (F)
Total	1.041786	47	.022166	
Weeks	.200395	3	.066798	8.2031
Stores	.531793	11	.048345	5.9370
Between groups	.012887	2	.006444	.7914
Within groups	.518906	9	.057656	7.0804
Treatments	.095611	3	.031870	2/3.9138
Weeks x groups	.031822	6	.005304	.6514
Treatments x groups.	.035584	6	.005931	.7284
Error	.146578	18	.008143	

1/ Sales data were converted to logarithms so as to handle the variation found in the components--weeks, stores, treatments, and error--of this analysis.

2/ Significant at the 5-percent confidence level.

Table 5.- Analysis of variance table for determining significance of effects of stores, weeks, and treatments on quantity of winter pears spoiled during various time periods, by specific stores in Pittsburgh, Pa., February 28 through March 26, 1955

Source of variation	Sum of squares	Degrees of freedom	Mean square	Variance ratio (F)
Total	2,059.7039	47	43.8235	
Weeks	269.6796	3	89.8932	3.0447
Stores	477.2679	11	43.3880	1.4696
Between groups	147.6455	2	73.8228	2.5004
Within groups	329.6224	9	36.6247	1.2405
Treatments	362.3081	3	120.7694	1/4.0905
Weeks x groups	286.3156	6	47.7193	1.6163
Treatments x groups.	132.6987	6	22.1164	.7491
Error	531.4338	18	29.5241	

1/ Significant at the 5-percent confidence level.

(time periods), stores, merchandising methods, and experimental error.

Data were gathered under normal store operating conditions. Consumers were exposed to only one merchandising method at a time for the commodity studied.

Usually one enumerator was assigned to each store. Enumerators were responsible for maintaining the displays in the prescribed manner for each merchandising method, according to the rotation schedule. In addition, they collected records of sales, spoilage, and other data and obtained a cash register count of those customers potentially exposed to the merchandising method being tested.

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